

and compete with screech owls and other species for suitable cavities (Balgooyen 1976). Highly valued cavity trees are aspen and cottonwood.

Kestrels have a wide ecological tolerance relative to elevation, tree species and type of forested environment. Kestrel distribution is strongly influenced by the availability of adequate nesting cavities and perches (Sedgwick and Knopf 1990). Since over 95% of forages are initiated from a perch, and prey is usually taken at ground level, perches within open areas are important habitat features (Balgooyen 1976). Hunting usually occurs over open terrain, with a preference for open, exposed ground in vegetated areas.

We frequently saw kestrels in cottonwood habitats (17 observations), and less often in aspen (4), over sagebrush (4), in lodgepole stands (1), in Douglas fir (4), in juniper (1), over a plowed field (1), and in mountain mahogany (1). We detected 7 nesting kestrel pairs in cottonwood riparian forest habitats. Nest sites were in cavities in older-aged trees at the edge of large stands or in small stands in the middle of openings. We did not find kestrel nests in forest interiors.

Turkey Vulture, *Cathartes aura*

Turkey vulture nesting habitat includes arid western plains and mountains, temperate forests and tropical lowlands (Pattee and Wilbur 1989). Nests are located on rock ledges in caves, down trees and buildings. (Jackson 1983, Coleman and Fraser 1989). These ledges are not necessarily high or large in area. Nest material is not brought in, but a scrape may be made in the ledge substrate. Turkey vultures appear to usually select nest sites that are within a forested environment and that have few roads and no buildings (Coleman and Fraser 1989). They also tend to perch and soar near their roosts and perch near nest sites.

Turkey vultures were detected in 9 times, 4 over sagebrush, 2 perched in Douglas fir forest, 1 over cliffs, 1 over plowed field, 1 perched in a large cottonwood. These birds were seen soaring over a variety of habitats, often over Douglas fir along the canyon rims. Several of these observations were of groups of vultures soaring together along the canyon rim. However, these flights appeared to be more dependent upon topographic relief than vegetative cover. We did not detect any nest sites.

Great Horned Owl, *Bubo virginianus*

The great-horned owl is found in a broad range of habitats (Austing and Holt 1966, Petersen 1979, Johnsgaard 1988, Rohner and Doyle 1992). The great-horned owl is probably the most common nocturnal raptor within our study area. Basic habitat needs are a nest site, roost site, and hunting area. Nests are usually stick nests built by other birds, such as red-tailed hawks or herons; great-horned owls also use cliff nests, ledges, and caves. Roosts are selected for maximum daytime concealment, conifers are favored.

Hunting areas are usually relatively open areas, but woodlands or areas with scattered trees are also used.

We have noted 21 records of great horned owls within the study area to date, 1 in aspen, 8 in Douglas fir, 2 in cliffs, and 10 in cottonwood forests. Vocalizing and foraging adults and one juvenile were most often found in trees at the edge of openings. Within forest observations were in mature stands with minor shrub understory.

Eight known nest sites have been noted, as follows: 5 in large cottonwoods in a red-tailed or Swainson's hawk nest, 1 in a large Douglas fir in a red-tailed hawk nest, and 2 on cliff ledges. Nest sites are typically in prominent trees, sites that may more directly reflect the habitat preferences of the primary nest builders, buteo hawks. The nest vicinities were generally mixed habitats, with dense shrub understory in nest stands, and open areas nearby. Cottonwood canopy cover in nest stands averaged 40%, and the Douglas fir nest was in a forest with almost 100% closure. This later nest was only 50 m from the forest edge adjacent to an open field.

Long-eared Owl, *Asio otus*

During the breeding season, long-eared owls are associated with coniferous, deciduous, or mixed composition forests (Johnsgard 1988), usually in areas adjacent to open grasslands or shrublands. In western Idaho, long-eared owls are found nesting in cottonwood, willow and juniper habitats (Marks 1986), and use old corvid nests almost exclusively. In eastern Idaho, nest sites have been noted in dense aspen stands, in mixed lodgepole pine/Douglas fir forests, and in juniper woodlands, usually at the edge of large open areas (Craig et al. 1988). In other areas, nesting has been noted in old red-tailed hawk and accipiter nests. Long-eared owls will also nest on platforms formed by mistletoe clumps.

During winter, dense conifer forests may be very important as roosting cover (Craighead and Craighead 1956). Large numbers of these owls will sometimes congregate at favored winter roosts in dense willow thickets within riparian bottoms (Bent 1938, D. Holt pers. comm.). Roosts may be used repeatedly over the years.

Within the Snake River study area, long-eared owls have now been noted in 6 records, 4 in Douglas fir and 2 in riparian cottonwood stands. All of these observations were in forested stands adjacent to open sagelands or meadows. In 3 cases, we saw adults foraging over the open, sage-dominated habitat. Singing males were found in old growth cottonwood and in Douglas fir; one nest was located in a cottonwood. In 2 cases where nests were presumably located, the Douglas fir stands featured mature but stagnant trees with DBH of 7 to 9 inches and tree canopy coverage of 60-75%, with a dense shrub understory. The third stand featured Douglas fir of mixed age, old-growth to mature, interspersed with aspen and some lodgepole, and with dense shrub understory. Fledged broods were seen on three occasions in Douglas fir forests at the forest edge. The Douglas fir habitats were on dry slopes of 13% to 30%.

Short-eared Owl, *Asio flammeus*

The short-eared owl is primarily associated with open habitats such as prairie, tundra and wetlands, and agricultural areas such as hay meadows, pastures, and old fields (Clark 1975, Johnsgard 1988). This owl forages on small mammals which are found in these habitats. Winter roosts may be found in conifers or cottonwoods with similar characteristics to those used by long-eared owls, and may even be shared with long-eared owls (Clark 1975). The short-eared owl is on the Audubon Society's blue list of declining species. This species is susceptible to the suite of ecological changes that can threaten many ground nesting birds, such as habitat alteration by factors such as fire or agricultural clearing and destruction by increased populations of foxes, skunks, ravens and other predators.

Short-eared owls were not detected in our samples, although we believe that they occur in open areas in the lower reaches of the study area. Population fluctuations may make this owl hard to find in some years.

Northern Saw-Whet Owl, *Aegolius acadicus*

The northern saw-whet owl uses forests and woodlands of all types (Cannings 1987, Palmer 1987). In the northern Rocky Mountains, nesting habitats include low elevation riparian habitats which are dominated by deciduous forests, mixed spruce-fir and Douglas-fir communities in the montane zone, and high elevation spruce-fir forests into the subalpine zone at elevations approaching 2300 m (Hayward and Garton 1988). As with other small, mostly nocturnal, cavity nesting owls, there is a notable lack of information on the population status of this species. The northern saw-whet owl nests in cavities excavated by northern flickers, hairy woodpeckers, man-made boxes and natural cavities. These owls often nest in aspen or cottonwoods.

The northern saw-whet was the most commonly detected of the small owls within our study area. This species was heard singing in upper elevations of the study area in forested stands adjacent to the riparian corridor, 3 records in mature aspen, and 7 records in Douglas fir. The fir stands were mixed-age on northern exposed slopes in tributary canyons, with canopy closures of 60-90%. Shrub understory was generally dense.

Northern Pigmy Owl, *Glaucidium gnoma*

The northern pigmy owl is a resident of forested habitat from the foothills to higher elevations (Reynolds et al. 1989). The diminutive size of this species and its nocturnal habitats have resulted in few nests being found and thus, little information on this species exists (Holt and Norton 1986). Nests have been found in dead and live Douglas-fir, ponderosa pine, aspen, grand fir and Western red cedar. Nest cavities used by pigmy owls have been excavated by sapsuckers and northern flickers. Nests may be found near openings such as meadows, partially timbered sites or wetlands (Reynolds

et al. 1989). Such locations are thought to be associated with foraging habitat. They are typically not found in continuous forests, but near clearings, meadows, open water or other such openings (Verner and Boss 1980). This owl is associated with low elevation habitat but does range into higher elevation mountain areas (Reynolds et al. 1989). Breeding territories are thought to course natural topographic features such as ridges.

During the nesting seasons, we have detected northern pigmy owls within the study area on two occasions, once within and once outside of a designated sample quadrat. Both observations were in Douglas fir habitats which feature large, older growth trees interspersed with aspen stands. Aspen and fir snags were located, but no occupied nesting cavities were found.

The northern pigmy owl is not thought to be migratory, although they may undergo an elevational shift in habitat between summer and winter. We have seen pigmy owls in cottonwood bottoms along the Snake River during winter.

Western Screech Owl, *Otus kennicottii*

The western screech owl is generally associated with deciduous tree stands in open country, especially riparian hardwoods (cottonwood) bottoms. In central Idaho, Hayward (1983) noted a strong preference for cottonwood river bottoms. Nearby open grassland habitats were used for foraging. These small owls nest in cavities, in woodpecker holes or natural cavities. They sometimes use flicker holes in deciduous trees along stream sides. They also roost against the boles of cottonwoods where their gray coloration is an effective disguise. They often roost in conifers within cottonwood forests. Johnson et al. (1979) reported that western screech owl pairs nesting in riparian forests may be separated by as little as 50 m (164 ft.). Territories may be separated by much greater distances.

We did not detect any western screech owls despite many searches in sample areas, but have heard these owls in mixed age and old-growth cottonwood habitats near Heise.

Flammulated Owl, *Otus flammeolus*

The flammulated owl is associated with mid-elevational open grown Douglas fir and aspen forests, usually on dry south facing slopes, at this latitude (Reynolds and Linkhart 1987). This species is a secondary cavity nester in cavities excavated by northern flickers and sapsuckers (Bull et al. 1990). Flammulated owls forage primarily upon insects, often upon beetles and noctuid moths, prey which may be more abundant in dry sites (Goggan 1986, Howie and Ritcey 1987, Reynolds and Linkhart 1987). Open growth forests that favor aerial insect hawking are thought to be an important habitat feature.

We have recorded 6 records of singing, and presumably nesting, flammulated owls, all in Douglas fir samples that featured mixed aspen. Five of these records were within the

same expansive Douglas fir covered slope, with the other observation in a very similar stand. These stands are dominated by mixed age Douglas fir, with many fir snags and interspersed aspen stands. Canopy cover in these stands is highly variable owing to the interspersed of many openings, with overstory coverage in forested areas ranging from 50-100%. Shrub understory is generally dense with diverse species, although some slopes are grass covered. Lodgepole pine stands are also featured in the areas.

Great Gray Owl, *Strix nebulosa*

Over their range in the northern and middle Rocky Mountains, great gray owls nest in a variety of forested habitats. Two habitat features common to these habitats are nest sites in mature or old-growth forest stands, and nearby openings for foraging (Habeck 1993). Nesting area habitats are always found within forested stands, and usually in stands with canopy closure greater than 60% (Nero 1980, Bull and Henjum 1990). Openings vary from marshes to clearcuts. In east-central Idaho, southwestern Montana, and the Greater Yellowstone Area, most observations of great gray owls were in the lodgepole pine/Douglas fir/aspen zone (Franklin 1987, Whitfield et al. 1995). Most of the nests reported by Franklin (1987) were in Douglas-fir forests, with nests most commonly in Douglas fir and lodgepole pine. Aspen are occasionally used.

Great gray owls do not build nests; nest structures are usually old hawk (usually goshawk) or raven stick nests, depressions in the tops of broken-topped snags, or dwarf-mistletoe platforms (Nero 1980, Mikkola 1983, Franklin 1988). Thus, great gray owl's are dependent upon habitats that support goshawks and other stick-nest builders, or feature large snags. Young great grays require forest stands with small, deformed, or leaning trees (Franklin 1987, 1988). During summer, juveniles avoid sunlight and seek shade and security cover by frequenting trees with a dense canopy (Whitfield and Gaffney 1997).

We did not detect any great gray owls within our study area. Great grays are known to nest near the study area in adjacent forested areas. Great grays are suspected to winter within the riparian cottonwood bottoms during years when snowfall is above average in higher elevations.

Barred Owl, *Strix varia*

Barred owls typically breed within dense, mature woodlands, varying from uplands to lowland swamps, but especially wetland areas in deep woods (Nicholls and Warner 1972, Elody and Sloan 1985). The barred owl is a forest-dependent owl, and in areas where forest habitats are relatively small in size, barred owls may be excluded by much larger great horned owls. Nesting territories are usually in mature and dense mixed deciduous/conifer forests, often near water (Bosakowski et al. 1987). Nests are most often in a cavity in a large tree (roughly 50 cm dbh or larger), often in a deciduous tree. The owls use natural cavities or old squirrel or hawk nests. Often nests are near forest

openings, and sometimes in the tops of hollowed tree stubs. Day roosts are typically in areas of maximum daytime concealment in densely foliated trees.

We did not detect any barred owls within the study area. However, barred owl range changes in recent years make it likely that this species will appear with the Snake River corridor.

Boreal Owl, *Aegolius funereus*

Boreal owls probably do not nest within our study area. This species is usually associated with higher elevation subalpine fir forest types, or mixed conifer and aspen (Hayward et al. 1993). Boreal owls are secondary cavity nesters.

Boreal owls are known to nest near the study area corridor, but at higher elevations. We detected a boreal owl in the cottonwood bottom below Dry Canyon in late fall, and suspect that this habitat may be used by wintering boreal owls.

Burrowing Owl, *Athene cunicularia*

Within this region, burrowing owls are found in isolated colonies in open plain habitats (Olenick 1989). Burrowing owls typically nest in flat pasture or grass lands where burrows are available (Johnsgard 1988).

We did not detect burrowing owls. They might be expected in the area's dryer habitats.

Winter Raptor Observations

We have not extensively studied the value of riparian cottonwood stands within the study area for wintering birds of prey. However, we have observed most of the species that do winter in this local within the cottonwood bottoms along the South Fork and Henry's Fork of the Snake River. Species we have observed in this habitat in winter include bald eagles, golden eagles, northern goshawk, northern pigmy owl, long-eared owl, and boreal owl. Great gray owls are found in the riparian bottom upriver of the study area on the Henry's Fork, and likely winter in the bottomlands along the upper South Fork as well.

The canyon reach of the South Fork represents a narrow corridor of relatively open habitat in winter. The lower reaches of the South Fork and Henry's Fork represent the only strips of largely forested habitat available within open, developed farm and recreational lands. As such, these habitats may have premium value for wintering wildlife. Because mortality of young fledglings is generally high for most species of birds of prey, survivorship of more advanced fledglings, those that survive the first few months, and certainly of adults, is of premium importance to long-term population sustainability. Thus, quality winter habitats found within the study area may be very important for those raptors that remain at this latitude year around.